Dual

Edition February 1980

Service Manual CS 650 RC

Technical Data

Measured values	typical values, Rumble and wow and flutter values obtained with test record.
Current	AC 50 to 60 Hz.
Line voltage	110 to 125 V, 220 to 240 V
Drive	electronically-controlled direct-drive system, Dual EDS 500
Power input	Motor at playing operation, approximately 2 watts < 50 mW
Power consumption	220 V. 50 Hz: at start 35 mA at play 15 mA 110 V 60 Hz: at start 65 mA at play approximately 25 mA
Time from start to rated speed	2 – 2.5 s at 33 1/3 rpm
Platter	non-magnetic, 1.4 kg, 304 mm diameter
Platter speed	33 1/3 and 45 rpm, electronically adjustable
Pitch control	Separate for both speeds, each adjustable by means of variable resistor, range of regulation: 10 %
Speed control (monitoring)	with illuminated stroboscope for platter speeds 33 1/3 and 45 rpm, 50 or 60 Hz.
Sensitivity of the illuminated strobe (for 0.1 % speed deviation)	6 division markings per minute at 50 Hz, 7.2 division markings per minute at 60 Hz.
Total wow and flutter (according to DIN 45 507)	(German Industry Standard) ±0.05 % WRMS ±0.03 %
Rumble (according to DIN 45 500)	Unweighted: 50 dB Weighted: 75 dB
Tonearm	Torsionally rigid tubular aluminum tonearm in low-friction four-point gimbal suspension.
Effective length of tonearm	221 mm
Offset angle	24° 4'
Tangential tracking error	0.16° /cm
Tonearm bearing friction (related to stylus tip)	vertical 0.07 mN (0.007 g) horizontal 0.15 mN (0.015 g)
Stylus pressure	from 0 to 30 mN (0 to 3 g) infinitely variable with 1 mN- (1/10 g) calibrations from 0 to 15 mN (0 to 1.5 g) operable from 2.5 mN (0.25 g) stylus pressure upwards.
Cartridges	with 1/2 inch screw-type attachment. These can be fitted with the special accessories no. 262 186 which can be obteined from trade dealers.
Weight	ca. 7,4 kg

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Fig. 1 Audio Connection Diagram

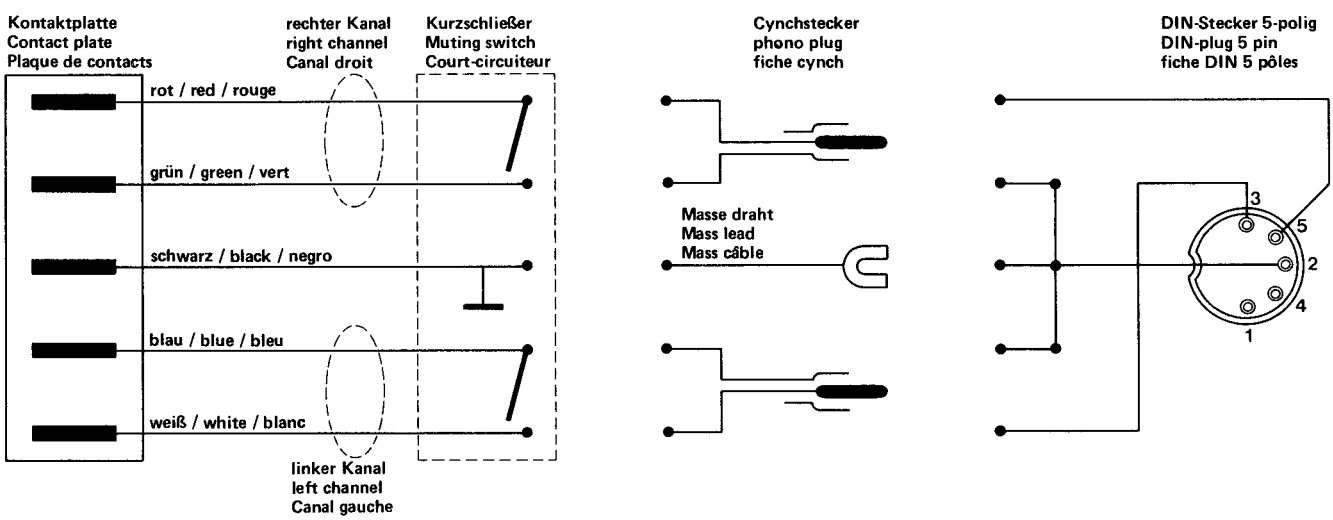
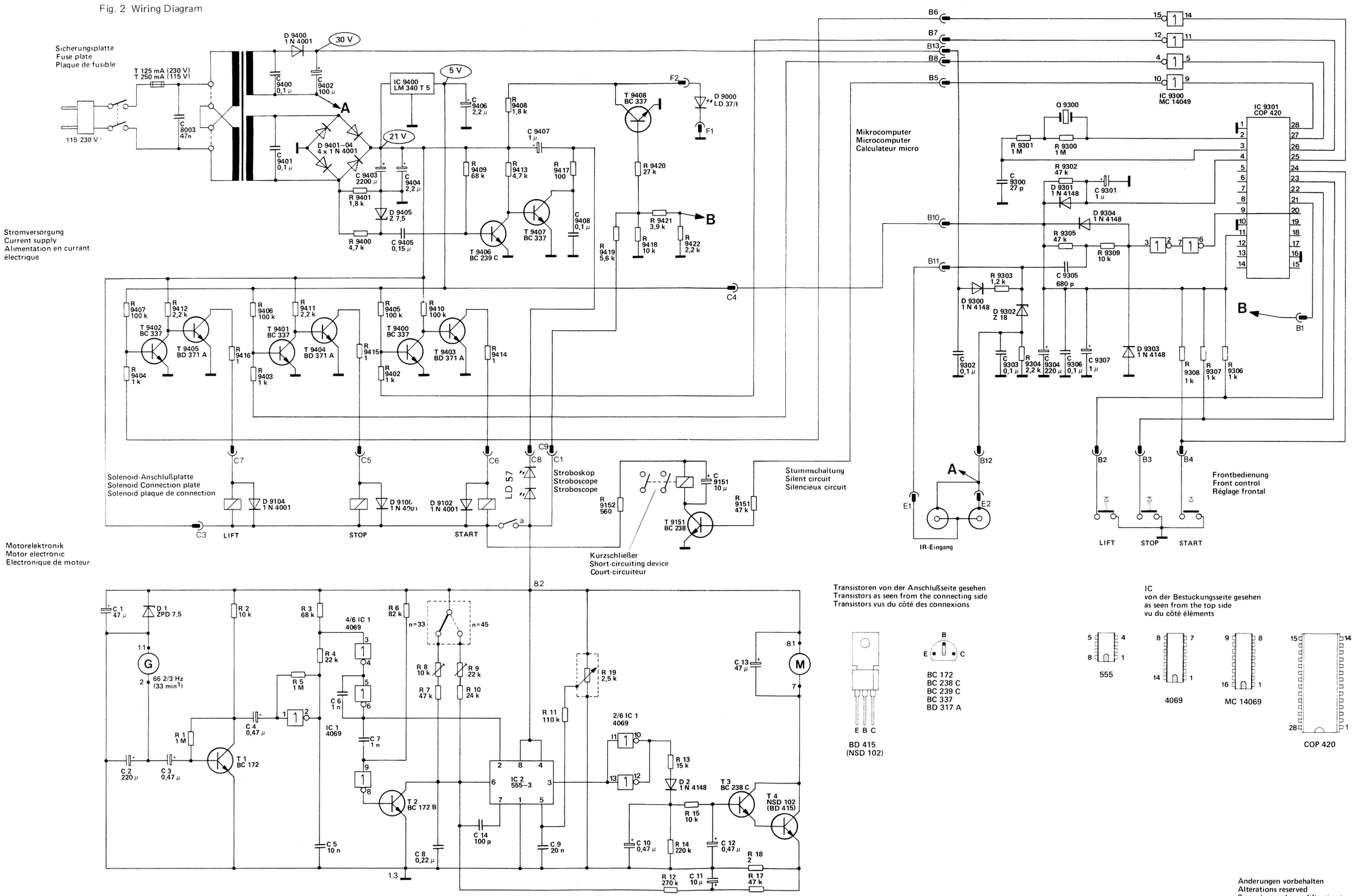
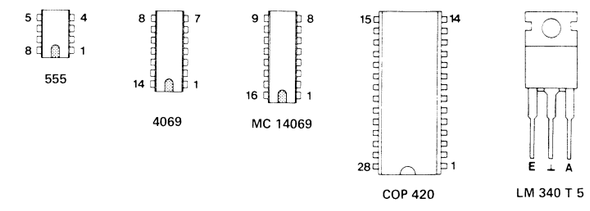


Fig. 2 Wiring Diagram



Transistoren von der Anschlußseite gesehen
Transistors as seen from the connecting side
Transistors vus du côté des connexions

IC
von der Bestückungsseite gesehen
as seen from the top side
vu du côté éléments



Änderungen vorbehalten
Alterations reserved
Sous réserve de modifications

Ausgabe 1/Januar 1980

| | | |

Fig. 3 Current supply (equipment side)

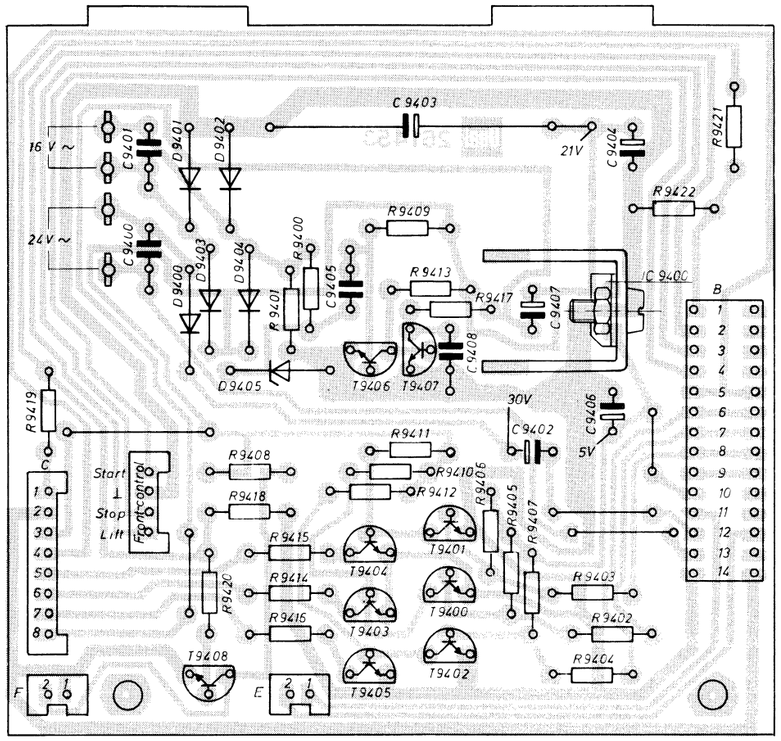


Fig. 4 Microcomputer board (equipment side)

Note
COP 402 type microcomputer boards have been fitted into turntables with serial numbers up to 16 000. If servicing is necessary, use the microcomputer board COP 420 Art.-No. 263 984 also for these units.

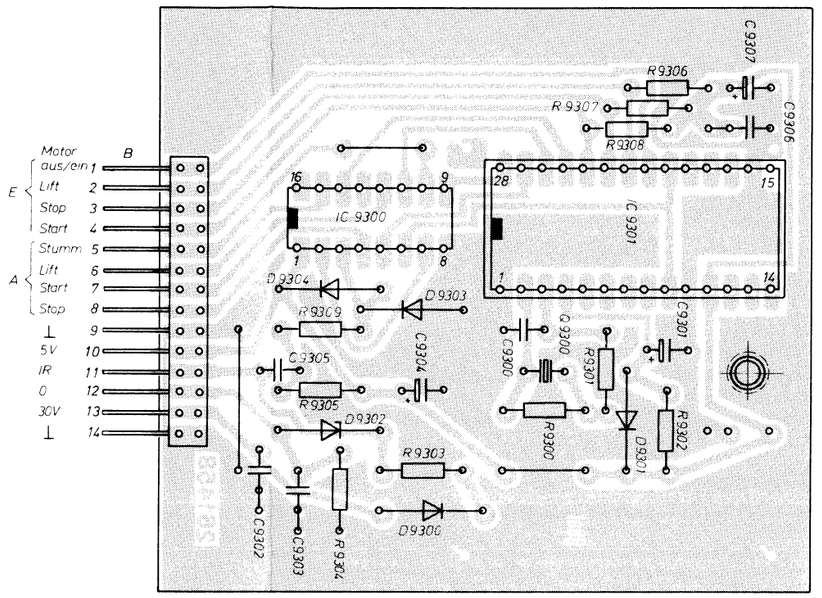


Fig. 5 Fuse plate (equipment side)

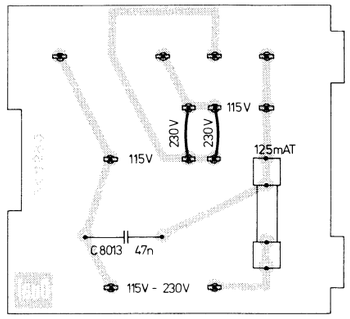


Fig. 6 Motor electronic (equipment side)

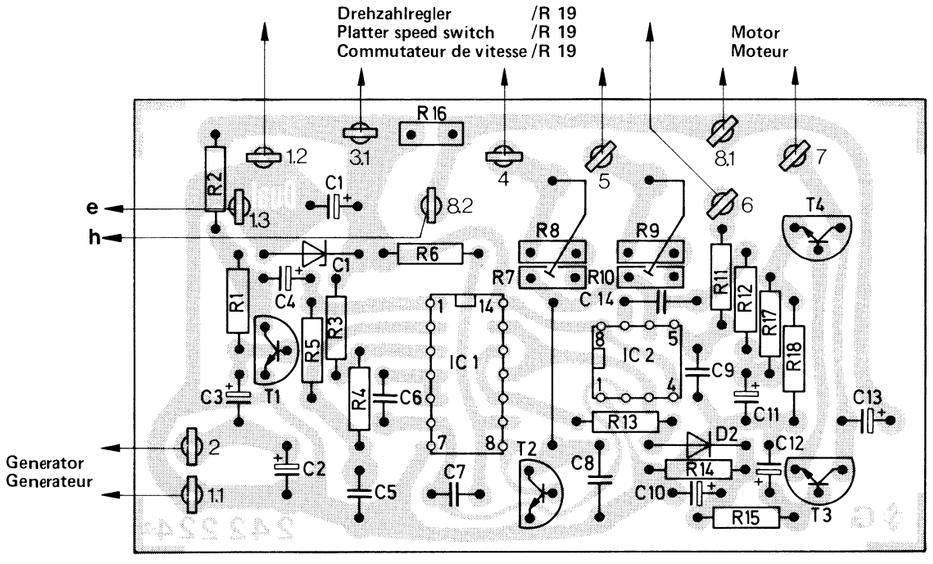


Fig. 7 Silent circuit (equipment side)

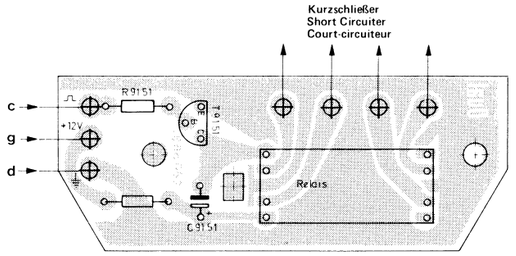
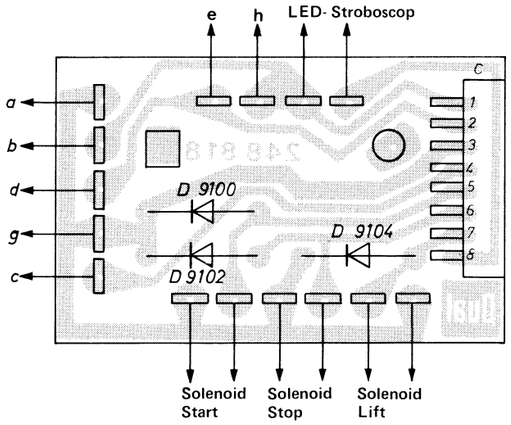


Fig. 8 Solenoid Connection plate (equipment side)



CS 650 RC Discription of Functions

The automatic HiFi record player CS 650 RC is a remote controllable turntable with front controls.
The power is supplied by means of a mains transformer and a power supply board. The turntable is switched to "stand-by" mode by operating the "power" switch.
D 900 and C 9402 on the power supply board provide a DC voltage of 30 V for the infrared receiver.

The 21 V DC voltage is generated by means of the diodes D 9401–9402 and C 9403. The direct drive motor, the stand-by LED, the selenoids, the stroboscope LEDs and IC 9400 are supplied with this voltage. The IC operating voltage of 5 V is stabilized by means of IC 9400. In addition to the voltage supplies, the solenoid driver transistors T 9400–T 9405 are accommodated on the power supply board.

The microcomputer board is linked to the power supply board by means of a connector strip.
Operation of the touch buttons for the functions "start, lift and stop" acts upon the inputs of the microprocessor. Via resistors, these three inputs become active "H". The corresponding input is set to "L" by operating a button. The microprocessor sets the corresponding output to "H".

The transistors T 9400, 9401 and 9402 are blocked via the inverter, the transistor T 9403, 9404 or 9405 becomes conductive and the command is executed by means of the solenoid.
The infrared signal is fed in via the capacitor C 9305. The operating voltage for the infrared receiver is stabilized to 18 V with the Zener diode D 9302.

The active duration of the commands start, lift and stop is fixed in the microprocessor and amounts to approximately 1.3 sec. During this time, the "muting" output of the processor receives active "L"; via the inverter, signal "H" reaches the base of T 9151 which activates the relay and thus shorts the two audio channels. The stand-by LED is activated via the resistor R 9408.

If the motor is switched on, signal "H" reaches the base of transistor T 9408, via R 9419 and R 9420, which becomes conductive and which switches off the LED. The same signal reaches the microprocessor via the voltage divider R 9421 and R 9422. This signal controls the microprocessor in such a way that the "stop" function is only performed when the motor is running.

Direct Drive System Dual EDS 500

For repair of the Dual EDS 500 special tools and measuring means are required. Work on the motor or motor electronics system should, therefore, only be carried out by an authorized Dual service station.

Replacement of motor electronics

1. Extract unit plug from power line. Lift off platter **4**. Loosen connection en solenoid plate **151**. Clamp unit in repair jig. Bring unit into head position.
2. Unsolder connection for operating voltage on solenoid plate **151**. Unsolder connecting leads on speed control **157**, turn switch **6** and generator. Open twists of holding angle **142** with flat pliers.
3. Pull off motor electronics **143** system from motor **141** carefully.
4. Fix replacement motor electronics.
   Solder connecting cables (see connection diagram Fig. 10).
5. With the unit in normal position connect it to power line. Switch on unit and check power consumption on operation:

   220 V/50 Hz approx. 15 mA
   110 V/60 Hz approx. 25 mA

   Check nominal speeds. If necessary, readjust as described below
6. Bring unit in the base **90**.

Replacement of motor mechanic

1. See obore. Clamp unit in repair jig.
2. Unsolder connecting leads to motor and the generator. Open twists of holding angle **142** with flat pliers. Lift off motor electronic **143**. Remove machine screw and holding angle **142**.

Fig. 9

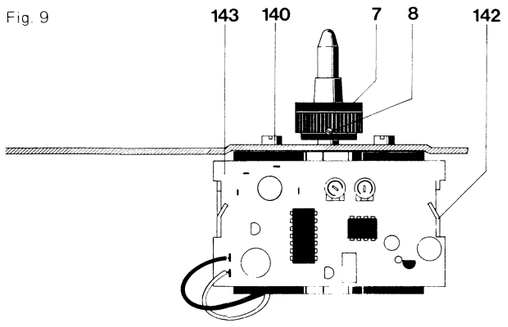
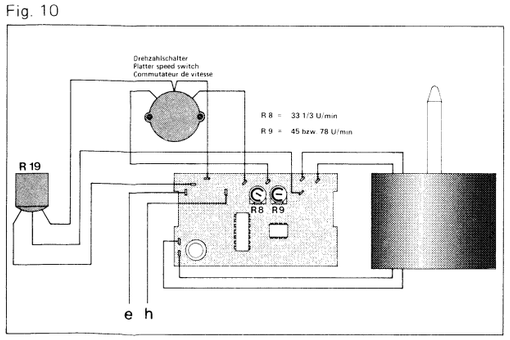


Fig. 10



3. Loosen threaded pins **8** and remove platter cone **7**. Remove the three screws **140**. Lift off motor mechanics **141**.
4. Put platter cone **7** on new motor mechanics and fix it. Fix new motor mechanics with the three screws **140**. Fix holding angle **142** with screws. Insert motor electronics **141** and twist holding pieces.
   Solder on resp. plug connecting leads (Fig. 10).
5. With the unit in normal position connect it to the power line Switch on unit and check power consumption when operating:

   220 V/50 Hz approx. 15 mA
   110 V/60 Hz approx. 25 mA

   Check nominal speeds. If necessary, readjust as described below.
6. Bring unit in the base **90**.

Setting nominal speeds

With knob **10** bring the fine speed control **157/R 19** into center position. With controls **R 8** and **R 9** on the motor electronic system adjust nominal speeds. Control **R 8** is used for 33 1/3 rpm, **R 9** for 45 rpm. Check with strobe disk.

Changeover to 78 rpm nominal speed

Instead of 45 rpm the can be changed to a nominal speed of 78 rpm.
To change the speed bring the fine speed control **157/R 19** in center position using knob **10**. Using control **R 9** on the motor electronics board **143** adjust for 78 rpm. Check with strobe disk.

Stroboscope

Accurate setting of the platter speeds 33 1/3 and 45 rpm can be checked during play with the aid of the stroboscope.

When the platter **4** is rotating at exactly 33 1/3 or 45 rpm the lines of the stroboscope appear to stand still. If the lines move in the direction of rotation of the platter, the platter speed is too high. If the lines move backwards, the platter is rotating more slowly than the nominal speed. Adjustment of platter speeds 33 1/3 and 45 rpm can make with the "pitch" control **10**.
Strobe markings are provided on the outer edge of the platter for 50 and 60 Hz line frequencies.

To replace LED **154** remove machine screws **156** and remove strobe cover **153**.

It can happen that the stroboscope lines appear to move slightly although the exact speed setting with stroboscope stationary has not been altered. This apparent contradiction is explained by the fact that the electronic central drive motor operates fully independently of line frequency whilst the only relatively accurate line frequency of the AC current supply is used for speed measurement with the light stroboscope. The constantly detectable fluctuations of line frequency by ± 0.2 % according to the information of the electricity supply companies brief frequency fluctuations up to 1 % are possible – only effect the stroboscope indication and can cause the lines to "wander" although the platter speed is as constant and absolutely accurate as before.

Pitch Control

Each of the two standard speeds 33 1/3 and 45 rpm (78 rpm) can be varied by about 10 %. The variable speed control **157/R 19** located in the voltage divider is adjusted by turning the pitch control knob **10**. By this the differential amplifier is altered and the motor speed accordingly.

Tonearm and Tonearm Suspension

The feather-light, extremely torsion resistant all-metal tonearm is suspended in a gimbal. Suspension is by means of 4 hardened and precision polished steel points which rest in precision ball bearings. Tonearm bearing friction is thus reduced to a minimum.

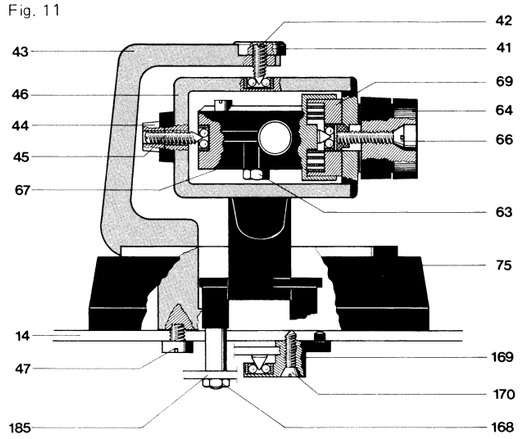
Bearing friction vertical	0.07 mN	(0.007 p)
Bearing friction horizontal	0.15 mN	(0.015 p)

as related to stylus point.

As a result, it ensures most favourable pick-up conditions. Before adjusting the tracking force to suit the built-in pick-up cartridge the tonearm is balanced with the scale set to zero. Coarse adjustment is carried out by moving the weight with the stem **40**, the subsequent fine adjustment by turning the weight.

The tracking force is adjusted by turning the graduated rotary knob **64** incorporating a coil spring. The scale has markings for a range of adjustment from 0 to 30 mN (0 to 3 p) which permit accurate adjustment of the tracking force. One graduation in the range of 2 – 15 mN (0.2 – 1.5 p) corresponds to 1 mN (0.1 p) in the range of 15 – 30 mN (1.5 – 3 p) to 2.5 mN (0.25 p).

Fig. 11

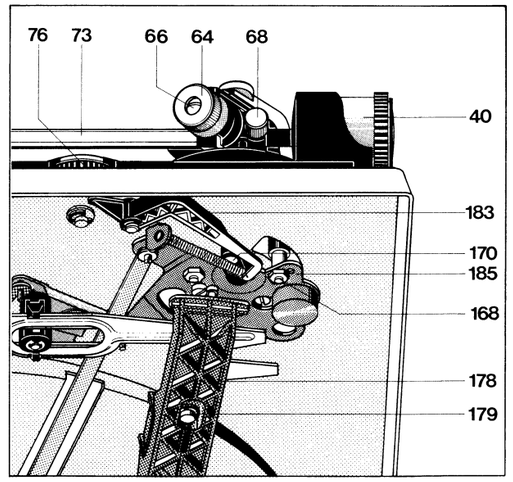


To remove the tonearm or the spring housing

1. Secure the unit in a repair stand. Turn the rotary turn switch **64** to the zero position. Lock the tonearm **73**. Remove the counterweight **40**.
2. Turn the unit over. Remove the screening sheet **217** and solder off the tonearm connections at the short circuiter **211**. Turn the unit the right way up.
3. Remove the fillister head screw **66**. Remove the rotary turn switch **64** and the washer **65**.
4. Loosen the nut **44** and the grub screw **45**. Draw the tonearm **73** complete with bearing **70** from the bearing race **46**. The spring housing **69** or the tonearm **73** may now be changed.

Reassembly involves the reverse procedure.

Fig. 12



Removal of tonearm assembly with tonearm bearing

We recommend the following procedure:

1. Clamp unit in the repair jig. Set the rotary knob **64** to zero. Lock tonearm **73**. Remove weight **46**.
2. Move unit into head position and remove the screening plate **217**. Unsolder the tonearm connections on the muting switch **211**.
3. Remove lock washer **179**. Lift off main lever **178** and bearing support **177**. Remove lock washer **191**. Lift off setting raie **191** and rotary bearing **189** and turn towards motor **141**.
4. Unlock tension spring **187**. Loosen lock washer **184** and remove skating lever **183**.
5. Remove lock washer **173** and slide bar **172**. Lift off shut-off bar **171** from segment **185**.
6. Remove hex nut **168**. Remove sink screw **170**. Hold tonearm **73** and lift off counter bearing **169** and segment **188**.
7. Remove tonearm complete with tonearm bearing.

Reverse this procedure when reassembling. Please bear in mind the threaded pin **42** is correctly positioned in the ball bearing.

Adjusting the tonearm bearing

First balance tonearm exactly. Both bearings must have slight, just perceptible play. The horizontal tonearm bearing is correctly adjusted when at anti-skating settings "0.5" and being touched it slides in without resistance. The vertical tonearm bearing is correctly adjusted when it swings in after being touched. The play of the horizontal tonearm bearing should be adjusted with threaded pin **42** and that of the vertical tonearm bearing with threaded pin **45**.

Fig. 13

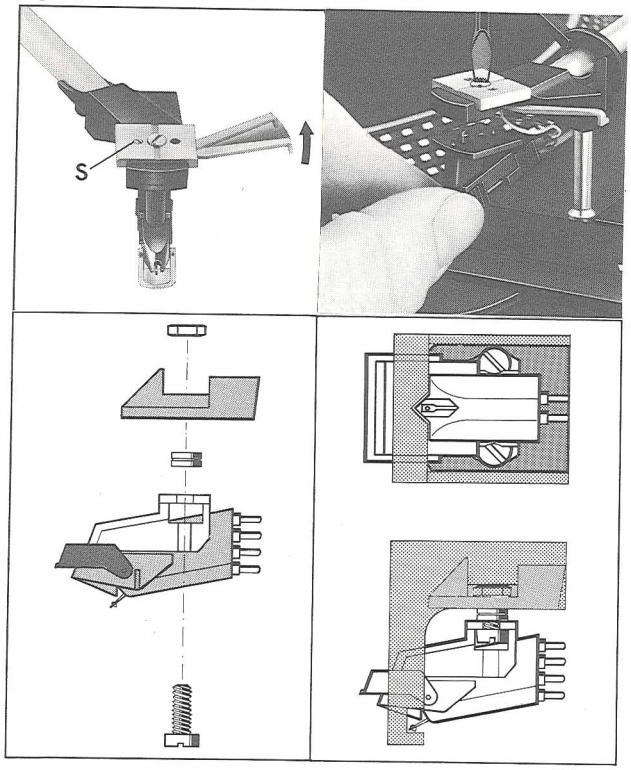


Fig. 14

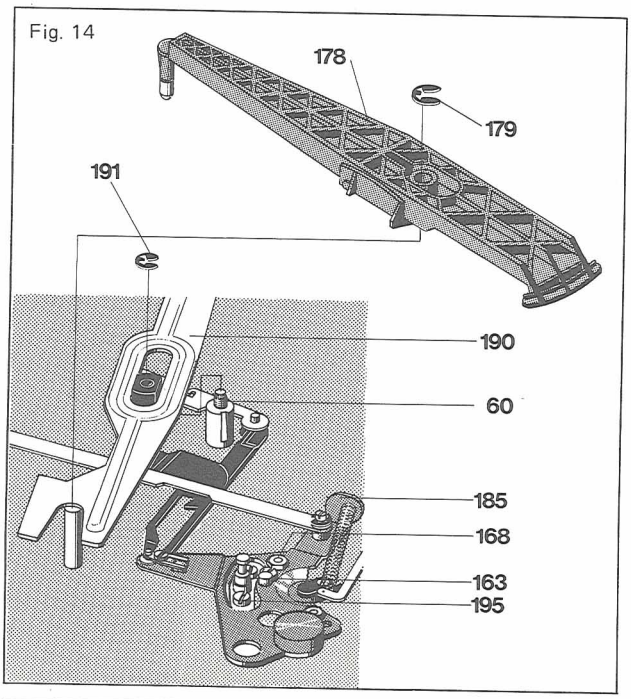
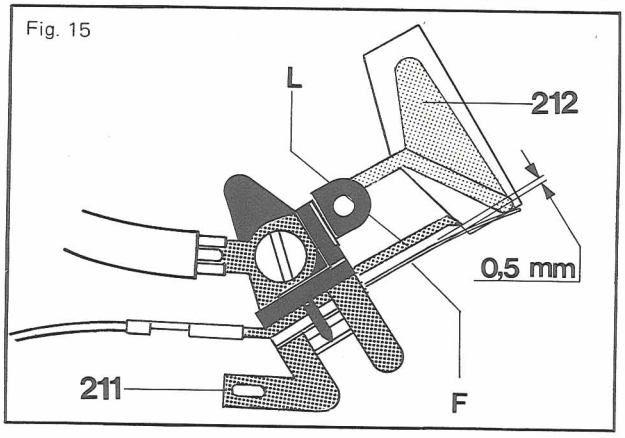


Fig. 15



Fitting a 1/2 inch cartridge

If a cartridge with 1/2 inch standard mount is to be fitted, the conversion kit **39** Number 262 186 is necessary. The proper method of fitting is shown in fig. 13.
Also the decorative cover should be removed from the counterweight **40** and should be fitted with the compensatory weight to be found in the conversion kit **39**.
Any alteration can only be carried out with the aid of a Dual-Skate-0-Meter and a test record and should only be done by an authorized service station.

Anti skating Device

To compensate for skating force use the knurled ring **76**. The asymmetric cam plate displaces the skating lever **183** from the tonearm pivoting point. The anti-skating force is transmitted to the segment **185** and to the tonearm **73** by tension spring **187**. Optimum adjustment is carried out at the factorys for styli having a tip radius of 15 µm (conical), 5/6 and 18/22 µm (elliptical).
Any alteration can only be carried out with the aid of a Dual-Skate-0-Meter and a test record and should only be done by an authorized service station.

Cue Control

By moving the lever **203** forward (▼) lift cam **204** rotates. The slide bar **190** transmits the lifting movement to the lift pin, that raises the tonearm. As a result, the cue control permits raise up the tonearm at any desired point.
The lever is released by moving the cue control lever rear wards (▼). As a result of the action of compression spring **181** the lift pin is brought back to its normal position and the tonearm loweres slowly Lowering of the tonearm is damped by silicone oil in the lift tube.
The lift can be varied by turning the sleeve **60**. The distance between the record and the needle should be 5 - 7 mm.

Replacement of Cue Control Plate

Replace cue control plate **163** as follows:

1. Clamp unit in the repair jig. and lock tonearm. Turn unit in head position.
2. Remove safety washer **179**. Lift off main lever **178** and bearing support **177**.
3. Remove safety washer **191**. Lift off positioning bar **190** and rotary bearing **189** and turn towards motor **141**.
4. Remove both machine screws **195**, remove lift plate compl. **163**.

For installation proceed in the reverse order.

Muting Switch

To prevent disturbing noises during automatic operation of the tonearm the unit is fitted with a muting switch. Control of the switch springs for both channels is effected by the camwheel. With the unit in neutral state the short circuit of the pick-up leads is eliminated.

Adjustment

In zero position of the cam there should be a clearance of approximately 0.5 mm between the contacts of the muting switch. This clearance should be adjusted by bending the muting switch contacts. The contacts should be sprayed with a suitable cleaning agent.

Tonearm Control

Automatic movement of the tonearm is initiated by the control cams on the inside of the cam wheel **5** on rotating through 360°. The control elements for raising and lowering are the main lever **178** and lifting bolt for horizontal movement the main lever **178** with segment **185**.
The automatic tonearm set down mechanism is designed for 30 cm and 17 cm records and is coupled to the platter speed changeover. The setdown points of the tonearm are determined by the spring pin of segment **185** contacting the slide bar **190**. Limitation of the horizontal movement of the tonearm is produced by the pin of segment contacting the stop attached to the slide bar **190**. Only during set-down does main lever **178** lift the slide bar **190** and the stop attached to it which, as a result, moves into the swivel range of the stop pin fitted on the segment. After completion of set down (lowering of the tonearm onto the record) slide bar is released again and returns to its neutral position. As a result, the slide bar moves out of the swivel range of the pin, so that unimpeded movement of the tonearm is possible for playing.

Start

Switching the switch lever **68** into the "start" position initiates the following sequence:

a) The Solenoid rotates the switch lever **147** which is pivoted about the notched stud. At the same time, the switch arm **53** is moved the motor **141**, via the switch **49**, and the platter starts turning.

b) Operating the switch lever **58** also releases the start slide which is drawn toward the cam by means of the tension spring **57**. By that the shut-off lever engage with the drive pinion and the cam turns.

Manual start

The latch **165** which is connected to the switch arm **53** engages in the four-sided plate when the tonearm is moved manually. The switch arm connects the mains supply to the motor **141** via the power switch **125** and the platter rotates.
When the run-out groove of the record is reached, the tonearm is lifted and returned, the motor is switched off automatically. If the tonearm is lifted off the record before the run-out, and returned by hand to the pillar, then the bolt on the segment **185** engages the latch **165** so that the switch arm is returned to its starting position. This switches off the mains supply.

Continuous Play

Continuous Play is switched on by turning the rotary knob **74** to "∞". The rotary knob **74** turns the switch angle **220**. The switch rod **219** keep the change lever **147** in starting position.
After the record has been played the tonearm returns automatically to the lead-in groove of the record. This procedure is repeated until the switch lever is brought to the "stop" position or the rotary knob **74** to position "1".

Adjustment Point

Pull mains plug. Remove platter **4**. Bring rotary knob **74** to position "∞". Turn cam wheel to central position. The change lever **147** turns the guide lever **U** and the top of the guide lever must at least be brought to the cam range. Adjust by bending the switch rod **223**.

Stopping

When control lever is set to "stop position the start slide **58** which is pulled towards the cam by means of tension **57**, becomes free. As a result, the shut-off lever is moved into the range of dogs cam. The lever remains in its stop position.

Fig. 16

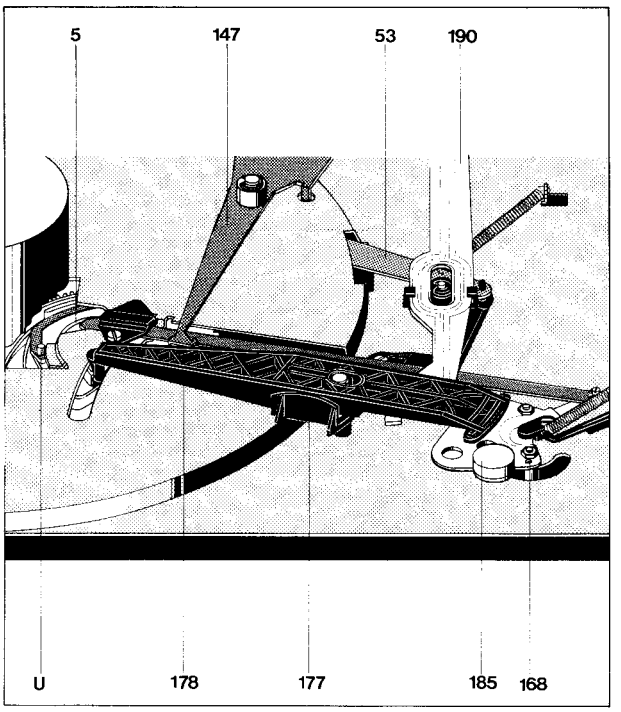
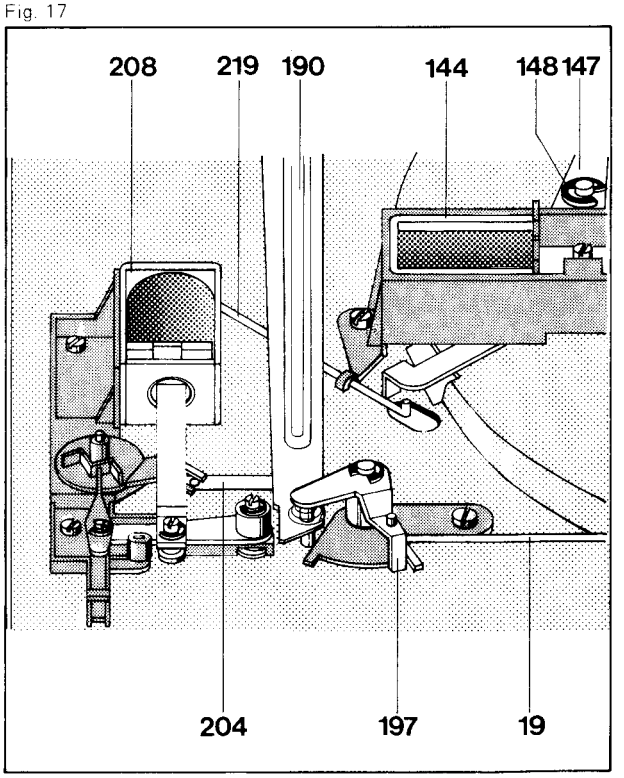


Fig. 17



Shut-off

The shut-off and stop functions depend on the position of the guide lever **U**. The guide lever **U** is brought to stop position by the main lever **178** after every start (longer end of the guide lever towards cam wheel centre).
The shut-off bar **171** is guided along in proportion to the movement of the segment **185**.
The shut-off procedure is imitated after a record has been played by the dog **M** of the platter and the shut-off lever **A**.

Fig. 18

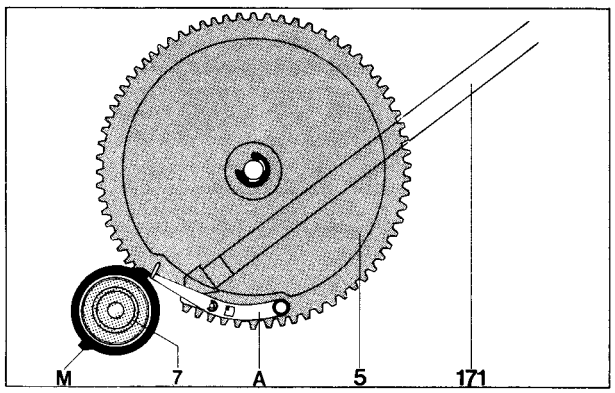


Fig. 19

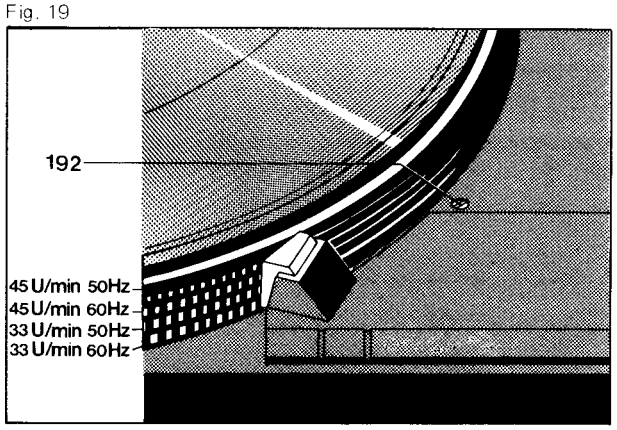


Fig. 20

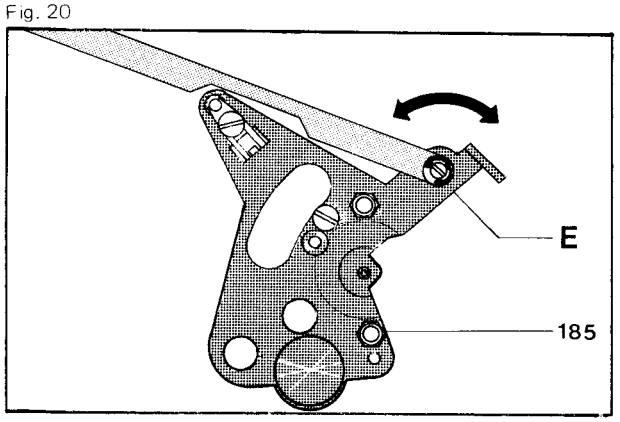
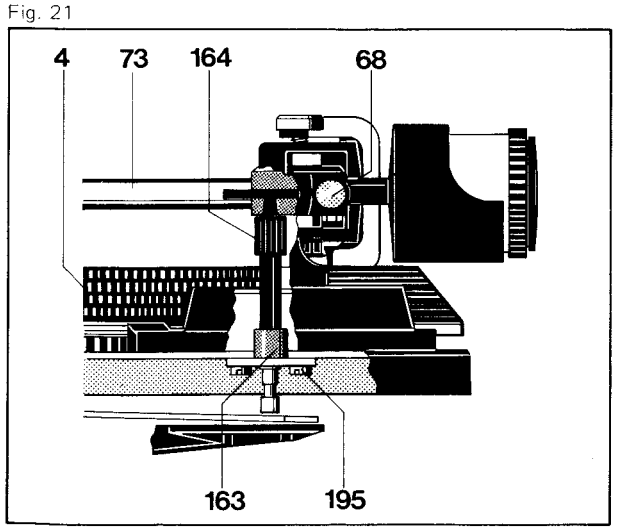


Fig. 21



The shut-off lever **A** is moved towards the dog **M** of the platter within the shut-off range (record diameter 116 mm to 122 mm). The dog engages the shut-off lever **A**. The cam wheel **5** is moved from 0 position and engage with the drive pinion of the platter. The main lever **178** guides the tonearm back and effected the tonearm to return to its rest position. During the running in of the cam wheel into 0 position the roll **55** of the switch arm can run into the cut-out provided at the cam wheel and achate the power switch **125**.

Adjustment Points

Tonearm set-down point

The set-down point can be varied with the eccentric bolt **192**. If the stylus sets down onto the record too far inside or outside turn eccentric bolt **192** in left or right direction.

Shut-off Point

The shut-off point (shut-off area of record diameter (116/122 mm) can be varied with the eccentric **E** mounted on the segment **185**.

Tonearm lifting height

a) Remove the mains plug. Guide the tonearm **73** towards the edge of the platter. The bottom edge of the cartridge housing should be parallel to the top edge of the platter cover. Carry out alignment by turning the adjusting sleeve **164**.

b) Press the start button and turn the platter **4** in normal direction until the tonearm **73** reaches its highest position. The tonearm should now have a vertical play of approximatelly 1 – 2 mm (measured at the tonearm post). If necessary, slightly turn the adjusting sleeve **164**.

Pull magnet "start/stop"

The stroke of the pull magnets can be altered with eccentric $\mathbf{E_1}$. The stroke should be set so that during "start" operation a play of minimum 0.1 mm is present between the lap of the deflection lever **147** and the start slide **58**.

Fig. 22

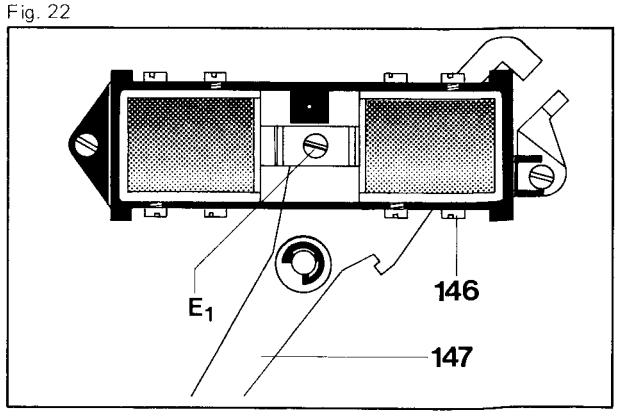
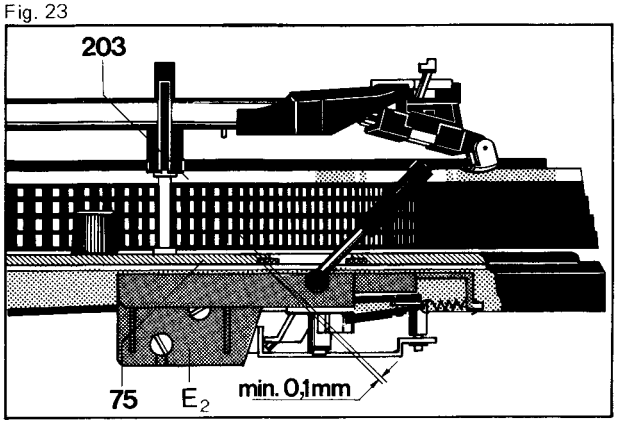


Fig. 23



Pull magnet "lift"

The stroke of the pull magnets can be altered with eccentric E_2. During operation of the pull magnet up to stop the lever **203** should still just evidence perceptable play (min. 0.1 mm).

Defect	Cause	Remedy
Tonearm does not set down on record or lowers too quickly when operating the cue control lever **203**	Excessive or insuffidient damping as a result of contamination of the silicone oil in the lift tube	Remove cue control plate **163**. Remove shaft pin **180** and washer **200**. Remove adjustment bush sleeve **164**. Remove washer **200**. Remove lift pin **181** and compression spring. Clean lift tube and lift pin. Smear lift pin evenly with "Wacker Silicon Oil AK 300 000". Reassemble components.
Vertical tonearm movement shows resistance	Excessive friction of Lift Pin in guide tube tube	See obove, if necessary change the cue control plate **163**.
Speed lies at limit of the range of adjustment of the pitch control	Nominal speed is maladjusted.	Readjust nominal speed, described on page 7.

Replacement parts

Pos.	Part.No.	Qty	Description
1	220 213	1	Centering piece
2	214 056	1	Washer
3	263 976	1	Platter mat cpl.
4	263 978	1	Platter cpl. with mat
4	262 693	1	Rocker cpl.
5	246 035	1	Cam weel cpl.
6	238 034	1	Rotary switch
7	242 192	1	Platter cone
8	242 191	3	Threaded pin M 3 x 3
9	262 634	1	Washer 8.2/15/0.6
10	260 336	1	Rotary knob "pitch"
11	260 335	1	Rotary knob
12	263 257	1	Pitch control cover cpl.
13	200 444	7	Spring washer
14	263 979	1	Mounting plate cpl.
15	236 843	2	Hinge cpl.
16	234 838	2	Adjusting wheel
17	210 286	2	Cheese head self-tapping screw B 2.9 x 9.5
18	231 767	2	Retainer plate
19	210 146	2	Securing disc
20	210 668	1	Washer
21	231 654	1	Hinge pin
22	234 145	2	Compression spring
23	231 657	1	Hinge tongue
24	231 656	2	Hinge cam
25	236 092	1	Washer
26	234 837	1	Adjusting nut
27	247 719	1	Fuse plate cpl.
	209 719	1	Fuse T 0.125 A/250 V (230 V)
	209 697	1	Fuse T 0.25 A/250 V (115 V)
28	263 980	1	Power transformer
29	246 079	1	Mounting plate cpl.
30	207 301	1	TA-cable cpl. with Cynch plug
31	209 425	1	Cynch plug white
32	209 426	1	Cynch plug black
33	243 750	1	Power cable Europe
	232 995	1	Power cable USA
35	237 548	2	Cable conduit
36	263 982	1	**Current supply plate cpl.**
9400	260 212	2	Female multipoint connector 2pole
9401	260 213	1	Female multipoint connector 4pole
9402	263 369	2	Female multipoint connector 8pole
D 9400	227 344	5	1 N 4001
D 9401	227 344	5	1 N 4001
D 9402	227 344	5	1 N 4001
D 9403	227 344	5	1 N 4001
D 9404	227 344	5	1 N 4001
D 9505	227 360	1	ZPD 7.5
T 9400	224 726	5	BC 337
T 9401	224 726	5	BC 337
T 9402	224 726	5	BC 337
T 9403	262 367	3	BD 371 A-25
T 9404	262 367	3	BD 371 A-25
T 9405	262 367	3	BD 372 A-25
T 9406	235 921	1	BC 239 C
T 9407	224 726	5	BC 337
T 9408	224 726	5	BC 337
IC 9400	261 333	1	LM 340 T 5
37	243 477	1	IR-Connection plate cpl.
38	263 984	1	**Micro computer board cpl.**
39	262 186	1	1/2 inch conversion kit G
40	263 263	1	Weight cpl.
41	249 383	1	Conter nut
42	230 063	1	Threaded pin
43	263 260	1	Frame cpl.
44	246 884	1	Counter nut
45	234 634	1	Threaded pin
46	263 329	1	Bearing frame
47	242 677	1	Machine screw
48	210 485	1	Machine screw
49	242 862	1	Micro switch
50	210 361	1	Hex nut
51	242 768	1	Bush
52	261 744	1	Tension spring
53	242 765	1	Switch arm
54	210 147	1	Lock washer
55	242 785	1	Roll
56	210 146	2	Lock washer
57	233 710	1	Tension spring

Fig. 24 Exploded view 1

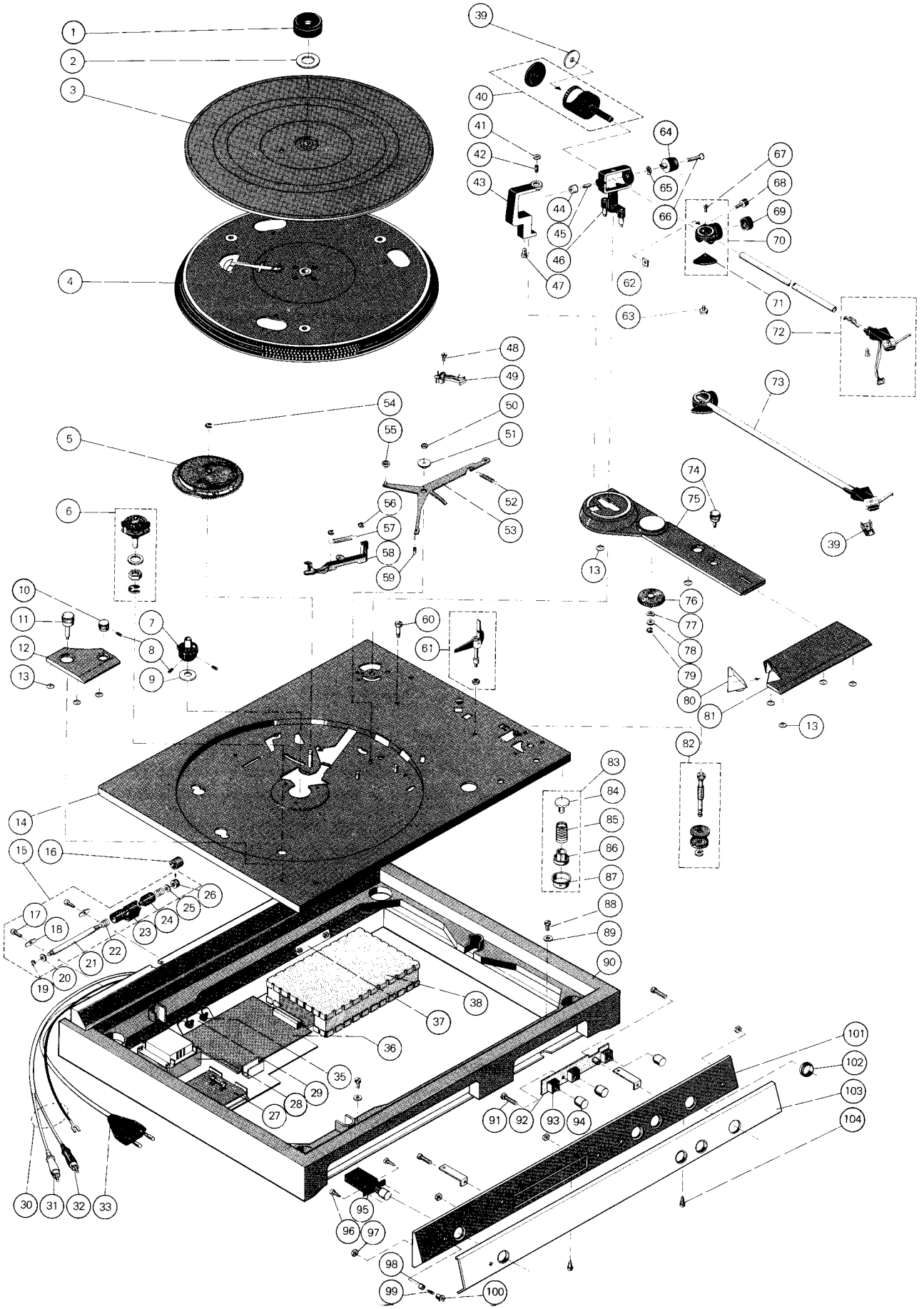
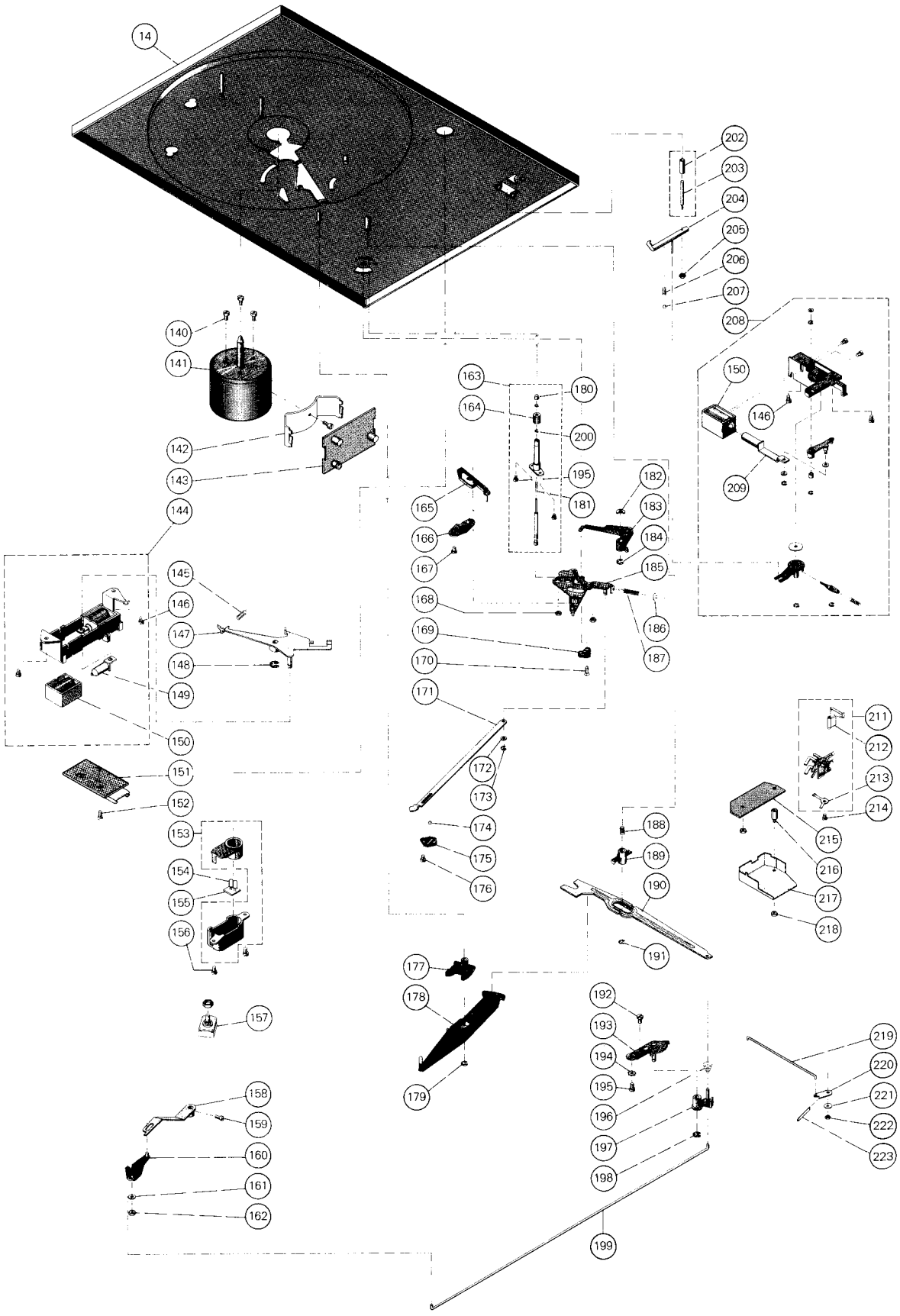


Fig. 25 Exploded view 2



Pos.	Part.No.	Qty	Description
58	261 199	1	Start slider cpl.
59	200 650	1	Rubber sleeve
60	242 770	1	Adjustment screw
61	263 334	1	Support
62	239 679	1	Square nut M 4
63	262 294	1	Hexagon self-tapping screw B 2.9 x 6.5
64	248 989	1	Rotary knob
65	261 798	1	Washer 5.2/10
66	249 097	1	Raised counter sunk head screw M 2.5 x 12
67	236 069	1	Machine screw M 2.5 x 4
68	260 428	1	Clamp screw
69	263 331	1	Spring housing cpl.
70	263 330	1	Bearing cpl.
71	248 979	1	Lift plate
72	263 259	1	Tonearm head cpl.
	261 929	1	Tonearm lead cpl.
73	263 262	1	Tonearm cpl.
74	260 334	1	Rotary knob
75	263 332	1	Rear covering cpl.
76	260 320	1	Cam disc
77	242 298	1	Spring washer
78	228 113	1	Washer 4.2/8/1
79	210 146	1	Lock washer 3.2
80	260 328	1	Stroboscope prism
81	263 985	1	Front cover cpl.
82	239 414	3	Transport lock cpl.
83	234 433	4	Spring mount cpl.
84	230 529	4	Threaded piece
85	232 843	4	Compression spring
86	200 723	4	Rubber damping
87	200 722	4	Steel cup
88	210 486	2	Machine screw M 3 x 8
89	210 586	2	Washer 3.2
90	249 312	1	CK 70 walnut console
	249 314	1	CK 70 agate-black console
	249 315	1	Cover CH 16
91	210 488	2	Machine screw M 3 x 12
92	263 987	1	Push plate cpl.
93	260 645	3	Tape switch
94	248 816	4	Push knob
95	248 058	1	Power switch
96	210 472	1	Machine screw M 3 x 4
97	210 366	4	Hex nut M 4
98	237 202	1	Clamp piece
99	235 851	1	LED 37/1 green
100	260 826	1	Bush
101	263 986	1	Fascia cpl.
102	260 394	4	Ring
103	263 988	1	Bracket fascia cpl. metallic-silver
104	263 989	1	Bracket fascia cpl. metallic-brown
104	247 353	3	Cheese head self-tapping screw
140	210 511	4	Machine screw
141	244 476	1	Motor mechanic
142	242 233	1	Up holder
			Motorelectronic
143	244 477	1	Motorelectronic cpl.
D 1	227 360	1	ZPD 7.5
D 2	223 906	1	1 N 4148
T 1	229 511	2	BC 172 B
T 2	229 511	2	BC 172 B
T 3	244 715	1	BC 238 C
T 4	242 306	1	(NSD 102) BD 415
IC 1	242 303	1	NS 4069
IC 2	242 304	1	NS 555
144	260 232	1	Magnet set start/stop
145	262 685	1	Tension spring
146	210 469	2	Machine screw M 3 x 3
147	261 065	1	Changeover lever
148	210 147	1	Lock washer
149	247 118	2	Armature
150	248 266	2	Pull magnet
151	263 990	1	Solenoid-Connection plate cpl.
	227 344	3	Diode 1 N 4001
152	210 283	1	Cheese head self-tapping screw B 2.9 x 6.5

Pos.	Part.No.	Qty	Description
153	263 336	1	Stroboscope housing cpl.
154	249 409	2	LED 57 CA
155	260 319	1	Dioden plate
156	210 469	2	Machine screw M 3 x 3
157	237 782	1	Speed control potentiometer
	238 073	1	Nut for potentiometer
158	242 187	1	Contact
159	210 469	1	Machine screw M 3 x 3
160	242 195	1	Contact piece
161	210 587	1	Washer 3.2/7/1
162	210 362	1	Hex nut M 3
163	246 043	1	Lift plate cpl.
164	218 318	1	Sleeve
165	242 764	1	Pawl
166	239 915	1	Square plate
167	210 472	1	Machine screw M 3 x 4
168	210 362	2	Hex nut M 3
169	242 615	1	Counter bearing
170	203 475	1	Sunk screw M 3 x 8
171	242 763	1	Shut-off lever
172	201 187	1	Washer
173	210 145	1	Lock washer 2.3
174	209 357	1	Ball
175	232 104	1	Ball bearing
176	210 472	1	Machine screw M 3 x 4
177	242 789	1	Bearing
178	246 042	1	Main lever
179	210 147	1	Lock washer 4
180	216 844	1	Control stud
181	234 798	1	Compression spring
182	242 298	1	Lock washer
183	244 331	1	Scating lever
184	210 146	1	Lock washer 3.2
185	263 335	1	Segment
186	218 591	1	Tension spring
187	201 184	1	Adjustment disc
188	244 834	1	Compression spring
189	237 498	1	Rotary bearing
190	242 769	1	Positioning rail
191	210 145	1	Lock washer 2.3
192	242 751	1	Excenter bolt
193	242 748	1	Plate
194	210 155	1	Washer
195	210 472	1	Machine screw M 3 x 4
196	243 706	1	Conical spring
197	242 771	1	Rotary plate
198	210 146	1	Lock washer 3.2
199	242 791	1	Switch slide
200	210 143	2	Lock washer 1.5
202	237 543	1	Rubber sleeve
203	247 509	1	Lever cpl.
204	247 289	1	Curve
205	210 353	1	Hex nut M 2
206	247 313	1	Compression spring
207	209 353	1	Ball
208	260 230	1	Magnet set Lift cpl.
209	247 417	1	Armature cpl.
211	242 612	1	Muting switch
212	242 790	1	Contact arm
213	239 806	1	Base shet
214	210 486	1	Machine screw M 3 x 8
			Silent circuit
215	263 991	1	Silent circuit
T 9151	229 511	1	BC 172 B
9151	247 775	1	Reed-Relais
216	247 515	1	Threaded pin
217	247 516	1	Screning shut
218	210 362	2	Hex nut M 3
219	242 774	1	Switch slide
220	247 288	1	Switch angle
221	210 549	1	Washer 2.1/5/0.5
222	210 353	1	Hex nut M 2
223	237 383	1	Spring
	261 530	1	Operating instructions
	260 796	1	Packing carton

Modification reserved!

Lubricating instructions

All bearing and friction points of the unit are adequately lubricated at the factory. Replenishment of oil and grease is only necessary after approx. 2 years of normal use as the most important bearing points have sintered metal bushes. The motor bearings have long-life sintered metal bushings and thus should not be lubricated. Bearing points and friction faces should be lubricated sparingly rather than generously. When using different lubricants, chemical decomposition can often take place. To prevent lubrication failure, we recommend using the original lubricants shown below.

Wacker silicon oil
AK 300 000

BP super viscostatic
10 W/40

Shell alvania No. 2

Fig. 26

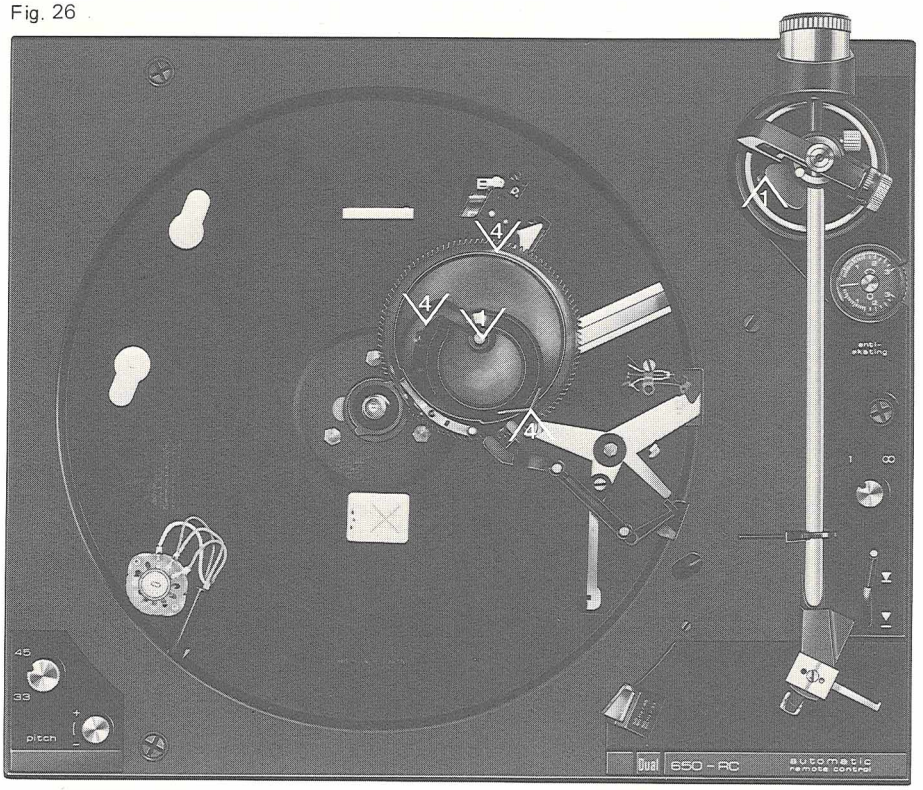
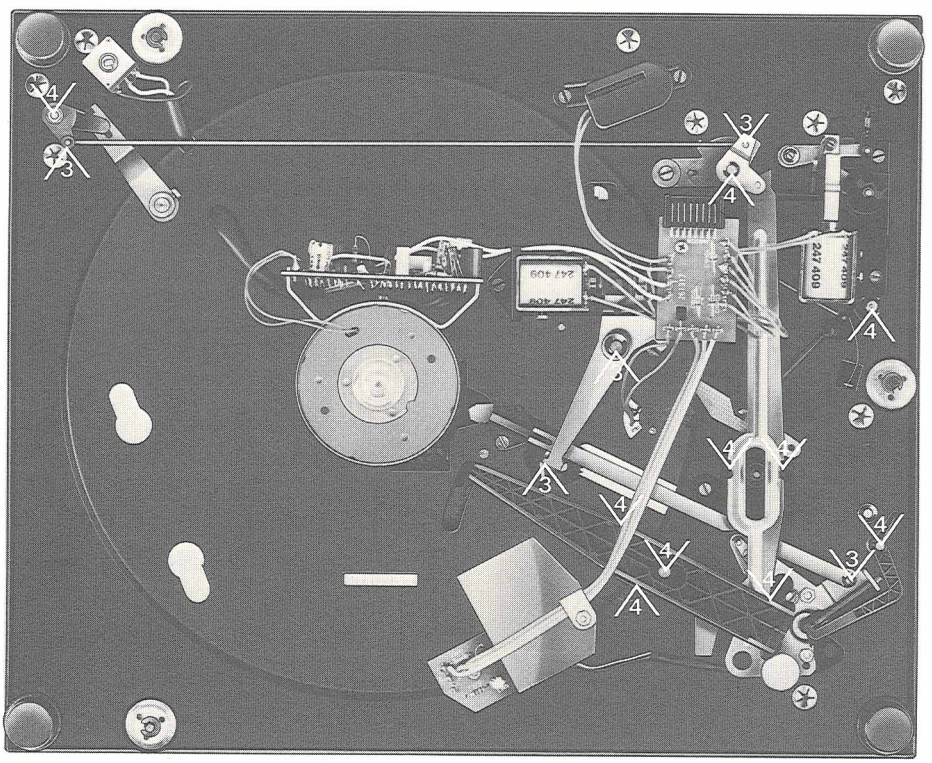


Fig. 27



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